U.S. Department of Transportation
Federal Aviation Administration

Advisory Circular

Subject:	Date:	AC No:
CONTROL SYSTEM OPERATION TESTS	Sept. 25,1984	23.683-1
	Initiated by: ACE-100	Change:

1. PURPOSE. This advisory circular provides information and guidance concerning acceptable means, but not the only means, of compliance with Part 23 of the Federal Aviation Regulations (FAR) and with Part 3 of the Civil Air Regulations (CAR) applicable to control system operation tests required for certification of small airplanes.

2. RELATED FAR AND CAR SECTION. Section 23.683 and Section 3.343.

3. BACKGROUND. FAR Section 23.683 and CAR Section 3.343 require showing by operation tests that, when the controls are operated from the pilot compartment with the system loaded, the system is free from jamming, excessive friction and excessive deflection. This section has not been uniformly applied. Some airplanes were certified using 50 percent of the control surface travel with no load as a criteria for meeting the -excessive deflection requirements for the operation tests. Other airplanes were not required to meet any specific travel as long as the airplane had adequate flight characteristics.

Requiring a specific large travel while under limit load could result in control system authority which is greater than desired or needed. However, some travel of the control surface should exist when the system is loaded to limit load. No travel could indicate there was a possible fault, such as a jammed system. Secondly, with little or no travel, operation of the controls would have such limited effect on the maneuverability of the airplane that it could have questionable flight characteristics.

4. ACCEPTABLE MEANS OF COMPLIANCE. One method, but not the only method, for showing compliance with the control system operation test requirements of FAR Section 23.683 and CAR Section 3.343 is as follows:

a. Conduct the control system operation tests by operating the controls from the pilot's compartment with the entire system loaded so as to correspond to the limit control forces established by the regulations for the control system being tested. The following conditions should be met:

(1) Under limit load, check each control surface for travel and detail parts for deflection. This may be accomplished as follows:

(i) Support the control surface being tested while positioned at the neutral position.

(ii) Load the surface using loads corresponding to the limit control forces established in the regulations.

(iii) Load the pilot's control until the control surface is just off the support.

(iv) Determine the available travel which is the amount of movement of the surface from neutral when the control is moved to the system stop.

(v) The above procedure should be repeated in the opposite direction.

(vi) A minimum control surface travel from the neutral position in each direction being measured should be 10 percent of the control surface travel measured with no load on the surface.

Regardless of the amount of travel of the surface when under limit load, the airplane should have adequate flight characteristics as specified in section 23.141. Any derivative airplane of a previous type certificated airplane need not exceed the control surface travel of the original airplane; however, the flight characteristics should be flight tested to ensure compliance.

(2) Under limit load, no signs of jamming or of any permanent set of any connection, bracket, attachment, etc., may be present.

(3) Friction should be minimized so that the limit control forces and torques specified by the regulations may be met.

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